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Sonographic Evaluation of Clinically Occult Inguinal Hernias in Patients With Scrotal Pain and Normal Scrotal Color Doppler Sonography

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Scrotal pain, whether acute or chronic, is a common clinical presentation that can be caused by a diverse array of disorders involving different anatomic structures. Because of pain and guarding, patients are usually incooperative for physical examination and thus, not be reliable. This makes definitive diagnosis difficult for even the most experienced clinician. Sonography can be invaluable in evaluating of patient with scrotal pain. The aim of this study is to assess the prevalence of occult inguinal hernia in patients with scrotal pain who have normal physical examination and normal scrotal color Doppler sonography to improve the weakness of clinical diagnosis. A total of 101 patients who have scrotal pain, were referred prospectively with clinically normal physical examination and normal scrotal color Doppler sonography for ultrasound examinations of occult inguinal hernia. Also we evaluate prevalence of unilateral or bilateral occult inguinal hernia and direct or indirect occult inguinal hernia. Overall, with mean age of 29.4 ± 7.56 years ,mean wight of 76.5 ± 9.52 kilogram and mean symtoms duration of 11.9 ± 9.15 days, scans showed 51.5% occult direct inguinal hernia,14% occult indirect inguinal hernia and 35% with no evidence of hernia.11.9% of patients have bilateral hernia, 21.8% have left inguinal hernia and 31.7% have right inguinal hernia. A higher incidence of inguinal hernia was associated with age increasement ($p = 0.015$) and weight increasement ($P= 0.01$). In conclusion, with achieved prevalence of occult hernia (65.5%), in patients with scorotal pain who have normal physical examination and normal scorotal color Doppler sonography in this study, we recommend ultrasonographic evaluation for these patients, since it's noninvasive and available.

Keywords: Scrotal Pain, Normal Color Doppler, Occult Inguinal Hernia.

The scrotal pain can be quite misleading on the first visit for many clinicians as various factors can contribute to the acute scrotal pain. Clinical checking and laboratory works can overlap here. Clinical inspection of the patient in this condition cannot yield reliable results due to patient's guarding, thus rendering the role of

sonography very important and central in diagnosing the patients complaining about scrotal pain. Cheap price, non-invasiveness, no need for radiation, imaging from various angles of the soft tissue with excellent quality and resolution are only some of the advantages of sonography. Patients are better able to cooperation with the operator during sonography and can localize the site of the pain and perform the dynamic maneuvers. Many of those who resort to hospital with scrotal and testicles pain are actually suffering from non-scrotal causes such as incarcerated hernia and kidney

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stone. The present research seeks to study the prevalence of hidden Inguinal hernia among those patients resorting to the hospital complaining of scrotal pain who undergo clinical inspections and natural color dopplersonography so that the clinical weakness of them may be improved through sonography.

Hagan *et al* (2007) stated that sonography can act as a useful tool in specifying the causes of the acute and chronic pain. They, then, described the various diseases that cause acute scrotal pain and their physiopathology in detail¹. In the study conducted by Ligouri *et al* (2011) it was claimed that acute scrotal pain can be really misleading in upon the first inspections and clinical inspections and laboratory symptoms may overlap. The clinical checking of the patient in this condition can not be reliable due to his guarding. Thus, sonography plays the central role in diagnosing the patients resorting to hospital with scrotal pain².

Mihmanlui *et al* (2009) described various abnormalities detected through sonography among those matured suffering from scrotal pain³. Aso *et al* (2005) also stated that using both gray scale and color Doppler sonography besides description and inspection can lead to the right diagnosis in the majority of the cases. The frequency of Inguinal hernia in their research was 5.3%⁴.

Bradley *et al* (2003) reported a sensitivity and specialty of 86% and 97% in diagnosing inguinal hernia using sonography, while these values for indirect hernia were 97% and 87% respectively⁵. In another study by Bradley *et al* (2006), the positive affirmative predictive value of sonography for diagnosing inguinal hernia was 98.3%⁶.

Robinson *et al* (2013) conducted a systematic and meta-analysis study about the role of radiology in diagnosing inguinal hernia. According to them, although herniagraphy is the best and the most accurate method to study occult inguinal hernia, sonography of the groin region along with appropriate clinical judgments are acceptable alternatives for thin invasive method in those centers where herniagraphy is not possible or in the cases where the patient or the doctor resists such a method. The other method introduced by these researchers as replicates for herniagraphy is MRI which is too costly. The

results of this research are based on studying 2886 medical files from 1950 onward⁷.

Moreno-Ega *et al* studied the clinical diagnosis accuracy of inguinal and femoral hernia and their efficiency in diagnosing and determining the type of surgery. Based on this research and keeping in mind the great value of determining the therapeutic strategy, accurate diagnosis and clinical diagnosis and appropriate imaging is significantly important. This research studied 278 patients who underwent operations with the possibility of inguinal and femoral hernia and diagnosis of their hernia was studied in a retrospective method (direct, indirect and femoral). The results of operations were compared against one another. 35% of the cases of hernia were in the category of direct inguinal hernia. The diagnosis accuracy of indirect hernia is the most compared to direct and femoral hernia. According to this study, the pre-operation clinical diagnosis was not influenced by the age, gender and location. However, the researchers arrived at the conclusion that regardless of the imaging method utilized before the surgery, it should not prevent the surgeon from conducting the exploration at the beginning of the operation⁸.

Alam *et al* (2005) investigated the accuracy of sonography in diagnosing the occult inguinal hernia among the adults in Oxford University. The present study seeks to investigate the accuracy of sonography in diagnosing adult hernia. The present study included 52 patients who underwent outpatient operation due to inguinal hernia, but their clinical check up was normal. All these patients underwent sonography before the operation and the correct therapeutic strategy was adopted based upon consultation with an experienced radiologist who was aware of their clinical condition. Next, the patients went herniagraphy or surgery. The results of sonography were compared against herniagraphy or surgery. The researchers arrived at the conclusion that the sonography has a sensitivity and specialty of 29% and 90% compared to herniagraphy. Compared to the results of operation, the researchers reported a sensitivity and specialty of 33% and 100% in diagnosing the occult hernia which had insignificant clinical symptoms and was not acute⁹.

Concerning those patients with normal sonography, there are some other diagnostic suggestions. Bradley *et al* (2006) studied the predictive power of sonography in occult hernia in the Royal College of London. Their research sought to determine the sonography value of diagnosing the occult abdominal or inguinal hernia. They selected 113 patients with positive clinical findings in the favor of occult hernia to undergo sonography and all those cases with positive sonography were also introduced for surgery or further imaging. Overall, there were 59 patients with positive radiologic findings in the favor of hernia and 56 of them were introduced for surgery. Their results indicate that sonography is the alternative diagonal method vis a vis surgery and endoscopy. 82 patients (70.6%) underwent sonography with 59 cases of hernia. The diagonal value of this method for hernia was 98.3%. 26 patients didn't exhibit any signs and symptoms indicating hernia and 4 patients were treated by medical methods⁶.

MATERIALS AND METHODS

The present cross-sectional research is designed to study the frequency of occult inguinal

hernia among the patients resorting to hospitals with scrotal pain who had normal color Doppler sonography. Within the period of the study during 2012, all the patients with normal examination complaining about scrotal pain who had resorted to sonography unit of Hasheminejad Hospital for color Doppler sonography and had normal color Doppler examinations underwent inguinal sonography to check for any occult hernia. The information required was asked from the patients and entered in the special form prepared for this purpose.

Some 101 patients were studied in this research. SPSS 17 was used for data analysis. Quantitative data was presented through mean and standard deviation, while qualitative data was presented in the form of frequency. T-test and Chi-square tests were used to compare the groups. The significance level was set to 0.05.

RESULTS

This is a cross-sectional research during which, 101 patients with the average age of 29.4 years, an average weight of 76.5 kg and an average period of 11.9 days for exhibiting the symptoms

Table 1. The frequency distribution of age, weight and markedness in patients

	Maximum	Minimum	Mean \pm standard deviation
age (years)	55	19	29.42 \pm 7.56
weight (kg)	100	60	76.59 \pm 9.52
period of symptoms (days)	30	1	11.96 \pm 9.15

The above table presents information about the age, weight, and length of the markedness of patients. As we can see in the table, the maximum age of the patients is 55 years with their minimum age being 19 kg.

Table 2. The correlation between weight and existence of hernia based on independent test

Existence of hernia	frequency	weight (kg)		mean \pm standard deviation	P-value
		minimum	maximum		
yes	66	65	100	78.35 \pm 9.19	0.01
no	35	60	85	73.26 \pm 9.35	
total	101	-	76.58 \pm 9.52		

The table indicates a significant correlation between the weight of the patients and presence of hernia

underwent sonography (table 1).

The following results were reported about the patients: 51.5% with direct hernia, 14% with indirect hernia, and 35% without any signs of hernia in their sonography.

11.9% of the patients had bilateral hernia, 21.8% were suffering from left hernia, 31.7% were diagnosed with right hernia, while 34.7% were not diagnosed with any hernia.

Concerning the correlation between the average age and hernia among the patients studied, a significant correlation was found (P – Value = 0.01) (Table 2).

Considering the results of this research and the age range of the participants (19-50), a significant difference was observed between age and the frequency of hernia (P -value = 0.015) (Table 3).

DISCUSSION

Although the majority of patients suffering from hernia complain about bulging and discomfort in the groin area, clinical diagnosis of this problem in the majority of the cases is not possible by merely relying on the patient's history and clinical examinations.

Symptoms such as formation of bulge or fullness while straining and coughing are quite effective in the clinical diagnosis of hernia (7, 10), but some patients resort to doctors only with pain which opens up a large scope of differential diagnosis to the doctor some of which are testicle disorders (torsion, semi-torsion and epididymoorchitis), abdominal wall hernia, musculotendinous causes (abductor muscle strain or tendinopathy), bone disorders (osteitis pubis and stress fracture), nervous disorders (ilioinguinal

and iliohypogastric nerves) and gastrointestinal problems. Differentiating between them is made possible through appropriate imaging so that we may discard surgery and rely on these alternative diagonal methods (7).

Anyway, the pre surgery clinical diagnosis of hernia is so important for the surgeon. It prevents any unnecessary operations and also affects the type of technique selected by the surgeon for patient. Some researchers believe that making the final decisions about the conducting the surgery or not is possible only after accurate and precise radiological examinations (8).

Sonography is a cheap, high resolution method which makes the direct and dynamic scan of the site of pain possible.

Anyway, the findings of sonography among fat patients are not so optimal and any approach towards these patients would depend on sonographer (9).

The main goal of sonography or any other imaging method among those patients who complain about groin area pain and can not be diagnosed clinically is to find a certain and justifiable reason for surgery or observation. Several researches have been conducted concerning the value of sonography in the clinical diagnosis of the patients complaining about groin area pain. Most of these researches such as Robinson *et al.* (7), Bradley *et al.* (6), Moreno *et al.* (8), and Alam *et al.* (9) confirm the value of sonography in making therapeutic decisions for this group of patients. However, some researches such as Kraft *et al.* believe that merely relying on sonography is not enough for this diagnosis (11).

There is no definite and certain information about the frequency and prevalence of occult inguinal hernia among adults, thus,

Table 3. The correlation between age and presence of hernia based on the independent test

Existence of hernia	frequency	minimum	age (years)		P-value
			maximum	mean+ standard deviation	
yes	66	21	55	30.74 ± 7.83	0.015
no	35	19	50	26.91 ± 6.4	
total	101	-	29.43 ± 7.56		

The table indicates a significant correlation between hernia and patient's age

rendering achievement of reliable statistics so valuable. Achieving such statistics was one of the goals of our research.

Our research is designed with a view of the previous studies that confirm the clinical value of sonography in diagnosing the patients suffering from groin pain without any clear clinical examination symptoms. As diseases such as testicle torsion and Epididymoorchitis are of emergency significant and failing to diagnose and treat them in the appropriate time might result in disorders such as infertility, we studied our population in terms of testicle disorders through Doppler sonography of the testicles. Those afflicted with such disorders were excluded from the population and introduced for appropriate therapeutic measures.

101 patients with pain in the scrotal and groin area who had a normal examination or there was no possibility of examining them due to their pain entered the research after color Doppler sonography and assuring of testicles' health. Next, they underwent inguinal sonography using a 10 MHz probe Siemens device under the supervision of a sonographer. The goal of this research was to study the frequency of each hernia in the above-said population.

As the results of our study indicate, 51.2% of the above-said population had direct hernia and merely 13.9% were afflicted with the indirect hernia.

However, 34.7% had no symptoms of hernia. These results are not in line with the results of the study conducted by Purkaystha *et al* (12) who considered direct inguinal hernia more common than its indirect counterpart. One of the causes of such discrepancy is probably the fact that the number reported in the above-said research has been achieved in a community of both male and female gender, while the current research has studied all types of non-occult hernia. Our whole study was conducted in a community composed of the masculine gender with negative clinical examination. Other factors such as genetics, nutrition, and type of free physical activity must also be taken into consideration while accounting for this paradox.

According to the results of our research, as the patient grew older, the level of inguinal hernia also increased. These results are in line with those reported by Abramson *et al* who reported a

frequency of 13% for inguinal hernia within the age range of 65 to 74, while this frequency among those older than 74 was 23% (13). These results have also been confirmed by Constance *et al*. That research which studied the risk factors of inguinal hernia within the population of US found that among the 5316 men studied, the frequency of hernia among those aging 40 to 74 years old was significantly more than other groups (14).

In our research, a direct correlation was observed between the age and hernia. These results were not much different from those reported by Cinstance *et al*. Having studying the 5316 men participating in our research, it turned out that gaining weight up to 82 kilograms increases the frequency of hernia (14). This study and some others have also named obesity (BMI > 30) as a protective factor for inguinal hernia (13, 14).

3% of the adults afflicted with inguinal hernia would require surgery (15). The ratio between male and female patients is 12 to 1. Although most of inguinal hernia cases require elective (not urgent) surgery, differentiating emergency cases who require surgery among them makes the value of radiology clear. As the results of our study shows, there is a significant correlation between the age of getting afflicted with hernia and the frequency of it. This is in line with the global findings that describe the 6th decade of life as the peak of affliction with hernia (15).

As the results of our study indicate, the frequency of bilateral hernia is much less than the single-sided hernia. The majority of those afflicted with hernia in our research were suffering from right side hernia.

CONCLUSION

Our research is one of the few ones which studies the frequency of hernia among the population that complains about groin pain but show no clinical symptoms indicating a certain problem.

Considering the frequency of occult hernia among the community of patients and keeping in mind the fact that sonography is a cheap, riskless and mostly convenient method, it can be an effective and acceptable method to examine the existence of occult hernia in patients with scrotal pain with normal clinical examination in terms of

the existence of hernia and normal scrotal color Doppler sonography. Thus, the results of sonography will have the greatest influence on the clinician's decision in diagnosing the disease and determining the appropriate therapeutic strategy.

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